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(54) HEADSET TEST DEVICE

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H04R 29/00 (2006.01)

(52) **U.S. Cl.**
CPC ***H04R 29/001*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,977,376 B1 *	3/2015	Lin	....	H04R 29/00 381/58
2015/0003649 A1 *	1/2015	Horbach	....	H04R 29/00 381/309

* cited by examiner

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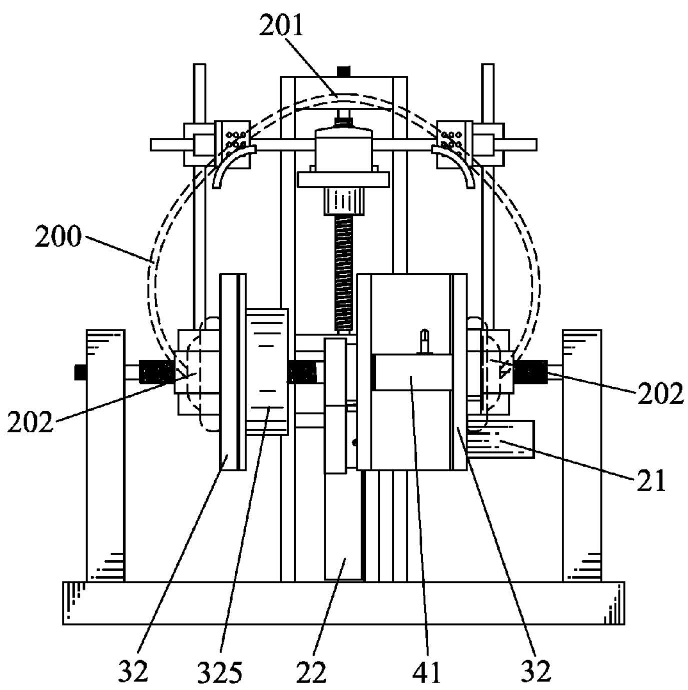
(57) **ABSTRACT**

A headset test device includes a supporting frame, a drive adjusting system, a head model mechanism and a sensing system. The supporting frame includes a transverse adjusting supporter assembly and a vertical adjusting supporter assembly. The drive adjusting system includes a first motor and a second motor. The transverse adjusting supporter assembly and the vertical adjusting supporter assembly are connected with and are driven by the first motor and the second motor, respectively. The head model mechanism includes a parietal region driven by the second motor to vertically move, and two aural regions driven by the first motor to move close to or away from each other for increasing or reducing a distance between the two aural regions. Each of the two aural regions is equipped with an artificial ear. The sensing system includes a force sensing unit, a pressure sensing unit and a temperature sensing unit.

13 Claims, 4 Drawing Sheets



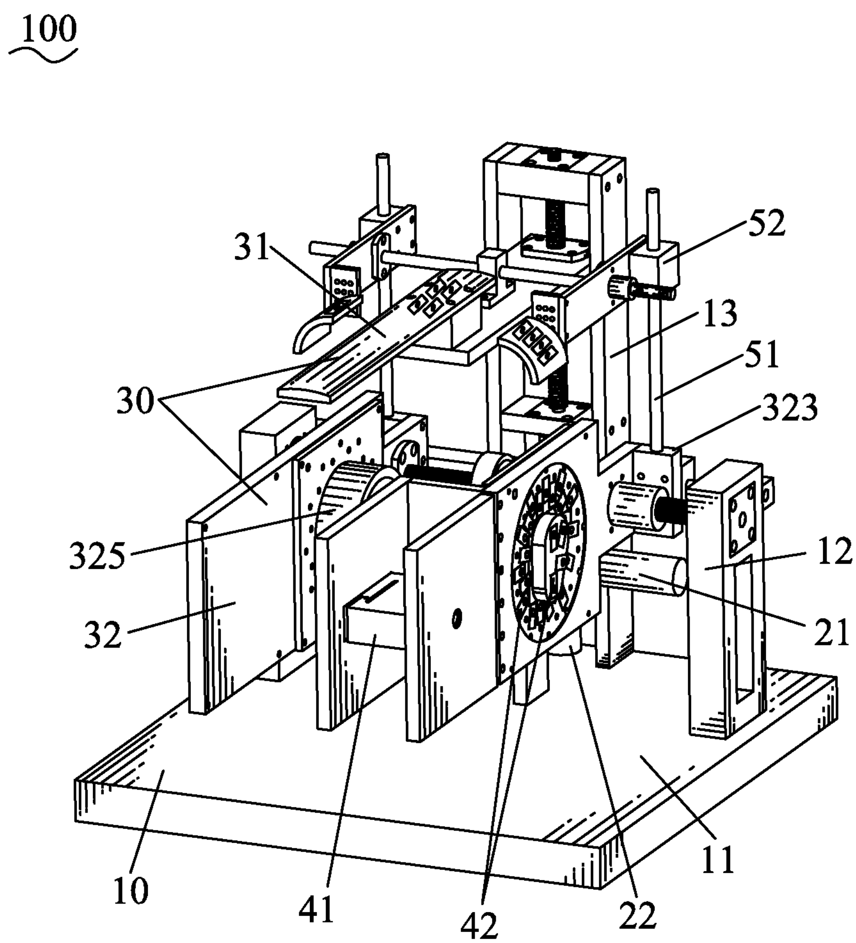


FIG. 1

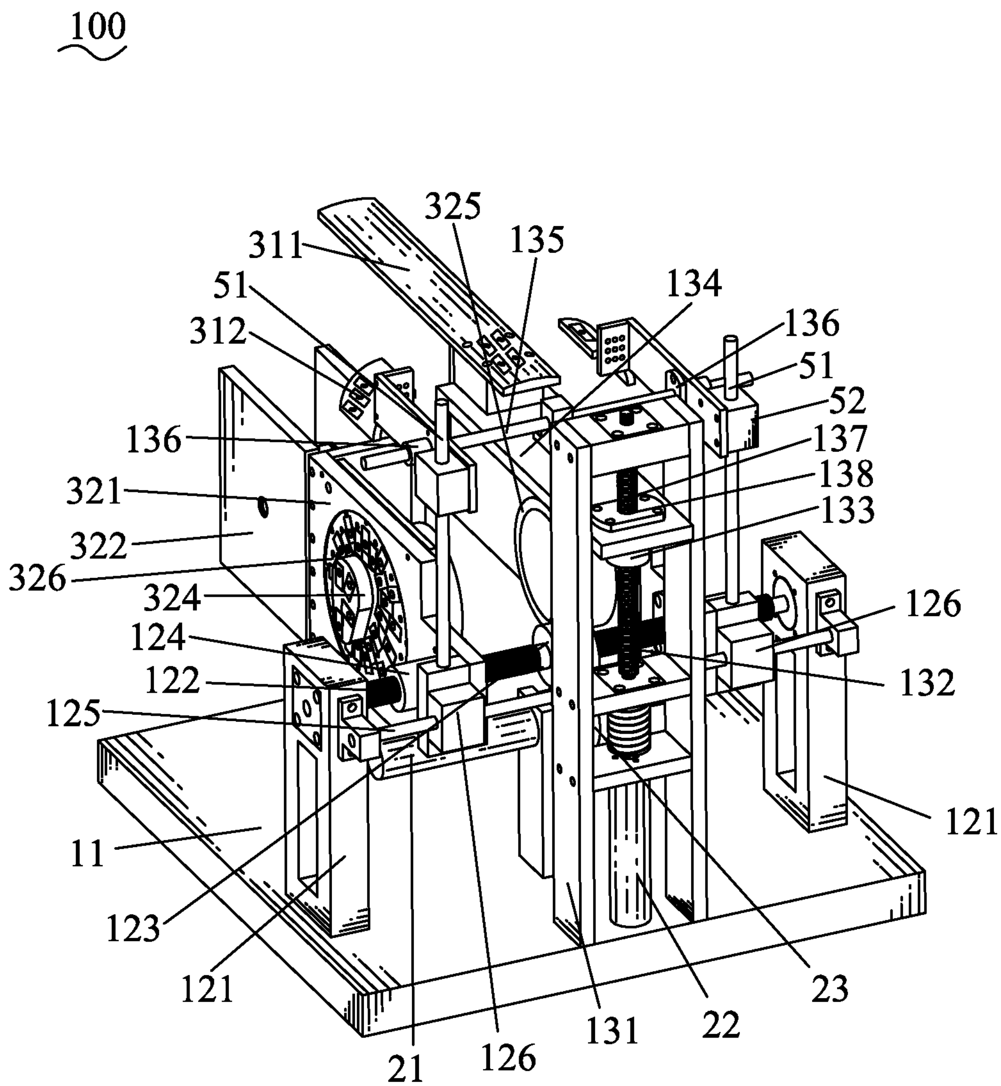

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FIG. 2

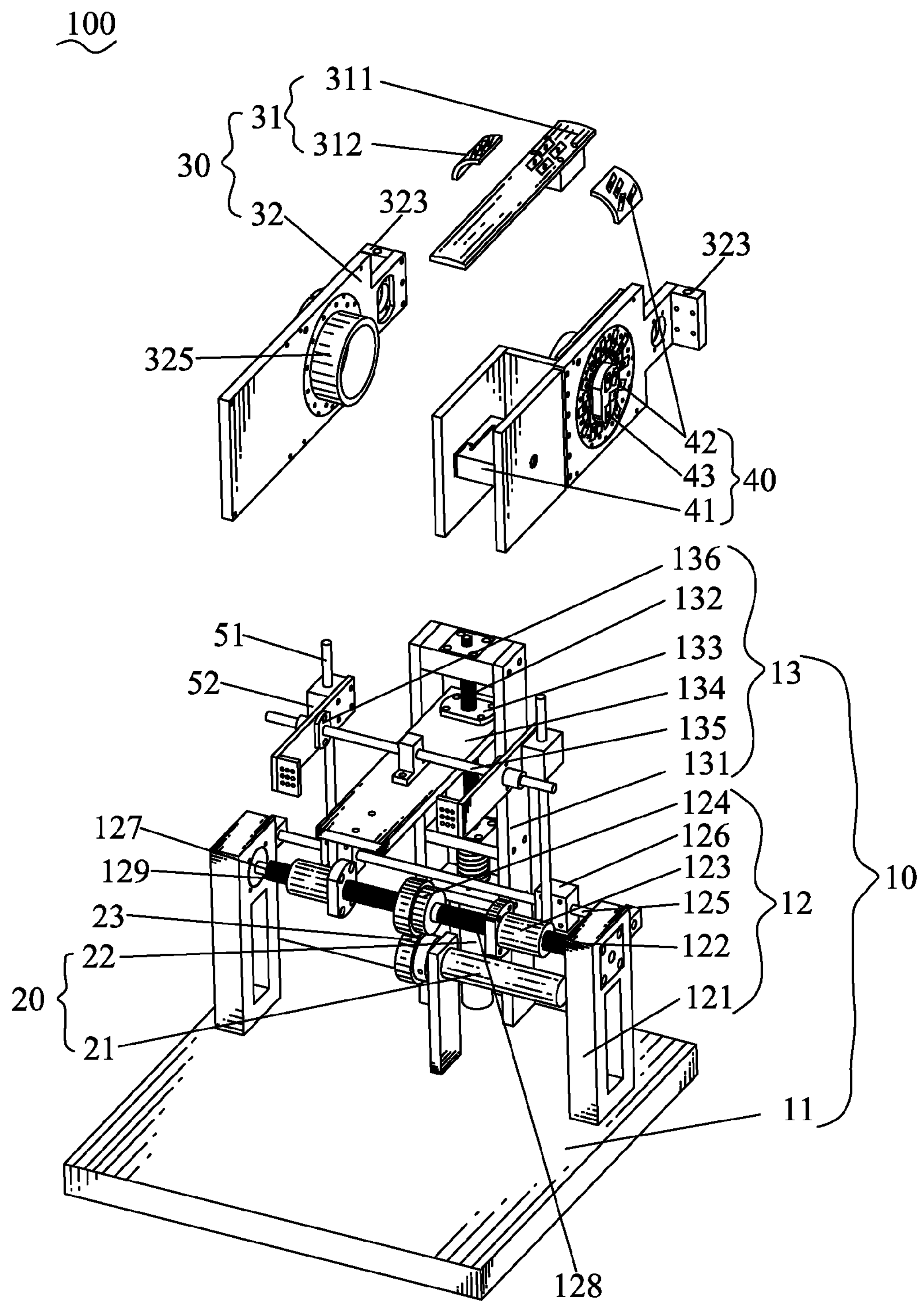
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FIG. 3

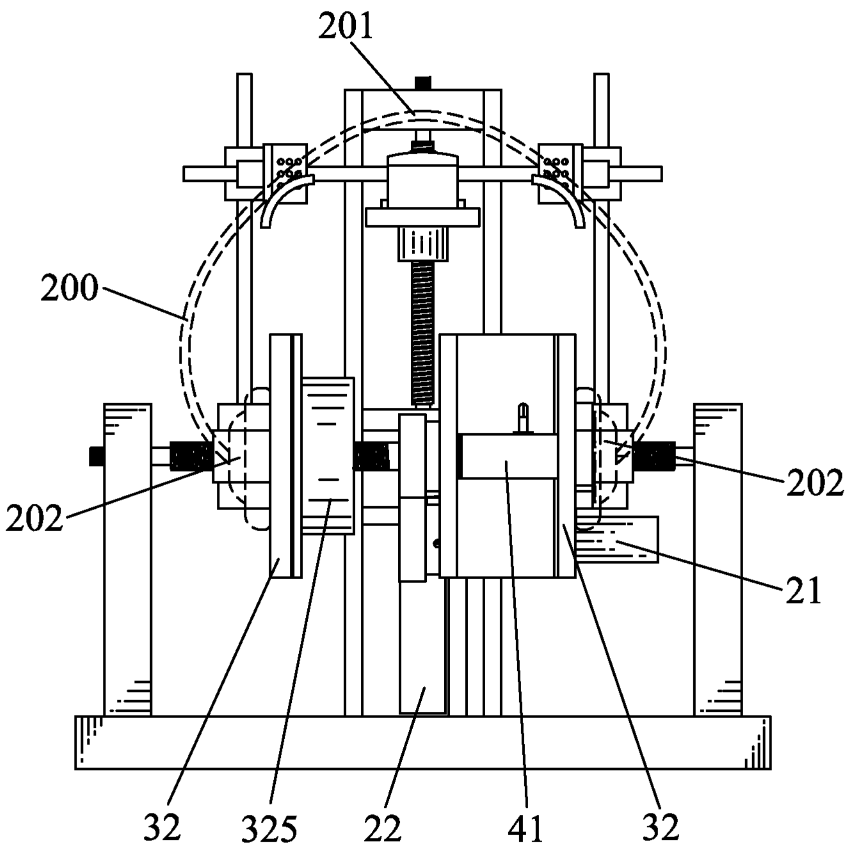

FIG. 4

HEADSET TEST DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a test device, and more particularly to a headset test device.

2. the Related Art

Nowadays, an ordinary music amateur, except for pursuing high quality sound of a headset, requires a comfort degree of wearing the headset to be higher and higher. When the music amateur wears the headset to enjoy better music, in order to avoid hearing damage of the music amateur, it need specify clamping pressure for preventing the clamping pressure being too larger to destroy the hearting of the music amateur. In addition to this, when the headset is worn by the music amateur, affections of a force, such as a clamping force and a temperature of the headset to ears of the music amateur are paid a great attention.

However, the clamping pressure, the force and the temperature are generally tested separately by virtue of more than one headset test device that brings an inconvenience to know quantitative data of the comfort degree of wearing the headset. Thus, it is difficult to provide the headset with the better comfort degree for the music amateur.

So an innovative headset test device is needed, the clamping pressure, the force and the temperature are tested by virtue of the single innovative headset test device to know the quantitative data of the comfort degree of wearing the innovative headset. Thus, it facilitates providing the innovative headset with the better comfort degree for the music amateur.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a headset test device. The headset test device includes a supporting frame, a drive adjusting system, a head model mechanism and a sensing system. The supporting frame includes a fixing base, a transverse adjusting supporter assembly and a vertical adjusting supporter assembly which are mounted on the fixing base. The drive adjusting system includes a first motor and a second motor. The transverse adjusting supporter assembly and the vertical adjusting supporter assembly are connected with and are driven by the first motor and the second motor, respectively. The head model mechanism includes a parietal region and two aural regions. The parietal region is mounted on the vertical adjusting supporter assembly, and is driven by the second motor to vertically move along the vertical adjusting supporter assembly. The two aural regions are abreast mounted to two opposite sides of the transverse adjusting supporter assembly transversely. The two aural regions are driven by the first motor to move close to or away from each other along the transverse adjusting supporter assembly for increasing or reducing a distance between the two aural regions. Each of the two aural regions is equipped with an artificial ear. The parietal region is located above an interval between the two aural regions. The sensing system includes a force sensing unit, a pressure sensing unit and a temperature sensing unit. The force sensing unit is disposed to one of the aural regions. The pressure sensing unit is disposed to the parietal region and the aural regions. The temperature sensing unit is disposed in the artificial ears of the aural regions.

As described above, the headset test device adjusts a distance between the parietal region and the aural regions to simulate different widths and heights of different heads by virtue of the first motor and the second motor, and clamping pressure, a force and a temperature are tested by virtue of the single headset test device to know the quantitative data of the comfort degree of wearing the headset. Thus, it facilitates providing the headset with the better comfort degree for the music amateur.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be apparent to those skilled in the art by reading the following description, with reference to the attached drawings, in which:

FIG. **1** is a perspective view of a headset test device in accordance with an embodiment of the present invention;

FIG. **2** is another perspective view of the headset test device of FIG. **1**;

FIG. **3** is a partially exploded view of the headset test device of FIG. **1**; and

FIG. **4** is a front view of the headset test device of FIG. **1**, wherein a headset is tested by the headset test device.

DETAILED DESCRIPTION OF THE EMBODIMENT

Referring to FIG. **1**, FIG. **2** and FIG. **3**, a headset test device **100** in accordance with an embodiment of the present invention is shown. The headset test device **100** is adapted for testing physical quantities of a headset **200** to know quantitative data of a comfort degree of wearing the headset **200** to provide the headset **200** with the better comfort degree for a music amateur who wears the headset **200**. The headset test device **100** includes a supporting frame **10**, a drive adjusting system **20**, a head model mechanism **30** and a sensing system **40**. The drive adjusting system **20** includes a first motor **21** and a second motor **22**.

Referring to FIG. **1** to FIG. **3**, the supporting frame **10** includes a fixing base **11**, a transverse adjusting supporter assembly **12** and a vertical adjusting supporter assembly **13** which are mounted on the fixing base **11**. Specifically, the transverse adjusting supporter assembly **12** includes two fastening elements **121**, a transverse rotating shaft **122**, a first transmitting roller **123**, two first threaded sleeve components **124** and a first sliding rod **125**. Two outsides of two opposite sides of the transverse rotating shaft **122** respectively define a plurality of first external threads **127** and a plurality of second external threads **128** which spiral in opposite directions. An inside of each of the first threaded sleeve components **124** defines a plurality of first internal threads **129**. The two fastening elements **121** are respectively mounted on two opposite sides of the fixing base **11** vertically. The first transmitting roller **123** is mounted around a middle of the transverse rotating shaft **122**. The transverse rotating shaft **122** together with the first transmitting roller **123** is pivotally mounted between the two fastening elements **121**.

Referring to FIG. **1** to FIG. **3**, the two first threaded sleeve components **124** respectively surround the two opposite sides of the transverse rotating shaft **122**. The transverse rotating shaft **122** rotates to make the first internal threads **129** of the two first threaded sleeve components **124** respectively engaged with the first external threads **127** and the second external threads **128** of the two opposite sides of the two transverse rotating shaft **122** so as to drive the two first threaded sleeve components **124** to transversely move along the transverse rotating shaft **122**. The transverse adjusting supporter assembly **12** further includes two sliding blocks **126**. The two sliding blocks **126** are respectively disposed around two opposite sides of the first sliding rod **125**. The first sliding rod **125** together with the two sliding blocks **126** is fastened between the two fastening elements **121**. The first sliding rod **125** is parallel to and is located behind the transverse rotating shaft **122**.

Referring to FIG. **1** to FIG. **3**, the vertical adjusting supporter assembly **13** includes a limiting element **131**, a vertical rotating shaft **132**, a second threaded sleeve component **133**, a fastening plate **134**, a second sliding rod **135** and two slidable locating elements **136**. An outside of the vertical rotating shaft **132** defines a plurality of third external threads **137**. An inside of the second threaded sleeve component **133** defines a plurality of second internal threads **138**. The limiting element **131** is vertically mounted on the fixing base **11** and is located behind the transverse adjusting supporter assembly **12**. The second threaded sleeve component **133** surrounds the vertical rotating shaft **132**. The fastening plate **134** is fastened to the second threaded sleeve component **133** and is parallel to the fixing base **11**.

Referring to FIG. **1** to FIG. **3**, the vertical rotating shaft **132** is capable of rotating. The vertical rotating shaft **132** penetrates through a top of the limiting element **131** to make the vertical rotating shaft **132** vertically mounted to the limiting element **131**. The vertical rotating shaft **132** rotates to make the third external threads **137** of the vertical rotating shaft **132** engaged with the second internal threads **138** of the second threaded sleeve component **133** so as to drive the second threaded sleeve component **133** together with the fastening plate **134** to vertically move along the vertical rotating shaft **132**. The second sliding rod **135** is mounted on the fastening plate **134** and is parallel to the transverse rotating shaft **122**. The two slidable locating elements **136** are slidably disposed around two opposite sides of the second sliding rod **135**. The two slidable locating elements **136** are capable of transversely sliding along the second sliding rod **135**.

Referring to FIG. **2** and FIG. **3**, the transverse adjusting supporter assembly **12** and the vertical adjusting supporter assembly **13** are connected with and are driven by the first motor **21** and the second motor **22**, respectively. The drive adjusting system **20** further includes a second transmitting roller **23**. The first motor **21** is mounted on the fixing base **11**. The second transmitting roller **23** is mounted around one end of the first motor **21**. The first motor **21** rotates to drive the second transmitting roller **23** to rotate so as to drive the first transmitting roller **123** together with the transverse rotating shaft **122** to rotate by virtue of the second transmitting roller **23** being engaged with the first transmitting roller **123**. The second motor **22** is connected to a bottom end of the vertical rotating shaft **132** so that the second motor **22** drives the vertical rotating shaft **132** to rotate.

Referring to FIG. **2** and FIG. **3**, the head model mechanism **30** includes a parietal region **31** and two aural regions **32**. The parietal region **31** is mounted on the vertical adjusting supporter assembly **13**, and is driven by the second motor **22** to vertically move along the vertical adjusting supporter assembly **13**. The two aural regions **32** are abreast mounted to two opposite sides of the transverse adjusting supporter assembly **12** transversely. The two aural regions **32** are driven by the first motor **21** to move close to or away from each other along the transverse adjusting supporter assembly **12** for increasing or reducing a distance between the two aural regions **32**. Each of the two aural regions **32** is equipped with an artificial ear **324**. The parietal region **31** is located above an interval between the two aural regions **32**.

Referring to FIG. **1** to FIG. **3**, specifically, the parietal region **31** includes a top portion **311** and two lateral portions **312**. The top portion **311** is mounted on the fastening plate **134**, and is located in front of second sliding rod **135**. A front end of the top portion **311** projects beyond a front of the fastening plate **134**. The two lateral portions **312** are fastened to two fronts of the two slidable locating elements **136** and are located above the two aural regions **32**, respectively. Each of the two aural regions **32** includes a first sensing area **321**, and a second sensing area **322** located in front of the first sensing area **321**. The first sensing area **321** is corresponding to a bottom of one of the lateral portions **312**. The artificial ear **324** is assembled to an outer side of the first sensing area **321**. Two rear ends of the two aural regions **32** are respectively fastened to the two first threaded sleeve components **124**. The head model mechanism **30** further includes two first connecting blocks **323**. The two first connecting blocks **323** are fastened to the two rear ends of the two aural regions **32**, respectively. The two sliding blocks **126** are respectively fastened to two rear surfaces of the two first connecting blocks **323**. So the two first threaded sleeve components **124** are respectively connected with the two sliding blocks **126**. The first threaded sleeve components **124** transversely move along the transverse rotating shaft **122** to drive the aural regions **32** to transversely move along the first sliding rod **125**.

Referring to FIG. **1** to FIG. **3** again, the headset test device **100** further includes two guiding rods **51** and two second connecting blocks **52**. The two guiding rods **51** are respectively fastened to the two first connecting blocks **323** vertically. Two rear ends of the two slidable locating elements **136** are slidably disposed to the two guiding rods **51** by virtue of the two second connecting blocks **52**, respectively. The two slidable locating elements **136** are capable of sliding upward and downward along the two guiding rods **51**, respectively. The two aural regions **32** are respectively connected with the two slidable locating elements **136** by virtue of the two rear ends of the two slidable locating elements **136** being slidably disposed to the two guiding rods **51**, respectively and the two first connecting blocks **323** being fastened to the two rear ends of the two aural regions **32**, respectively. So when the two aural regions **32** are driven to move close to or away from each other for increasing or reducing the distance between the two aural regions **32**, the two lateral portions **312** together with the two slidable locating elements **136** are driven to move close to or away from each other along the second sliding rod **135** for increasing or reducing a distance between the two lateral portions **312**. An inner side of the first sensing area **321** of each of the two aural regions **32** is equipped with a heating unit **325** for heating peripheral components of fastening the artificial ear **324** to simulate a human body temperature.

Referring to FIG. **2** and FIG. **3**, the sensing system **40** includes a force sensing unit **41**, a pressure sensing unit **42** and a temperature sensing unit **43**. The force sensing unit **41** is disposed to the second sensing area **322** of one of the aural regions **32**. The pressure sensing unit **42** is disposed to the parietal region **31** and the aural regions **32**. Specifically, the pressure sensing unit **42** is disposed to the top portion **311**, the two lateral portions **312**, the two artificial ears **324** and two circumjacent areas **326** of the two first sensing areas **321** respectively around the two artificial ears **324**. The temperature sensing unit **43** is disposed in the artificial ears **324** of the aural regions **32**.

Referring to FIG. **1** to FIG. **4**, when the headset test device **100** is in use, the first motor **21** is started, the first motor **21** rotates in a forward direction. The first motor **21** drives the transverse rotating shaft **122** to rotate by virtue of the second transmitting roller **23** being mounted around one end of the first motor **21**, the first transmitting roller **123** being mounted around the middle of the transverse rotating shaft **122**, and the second transmitting roller **23** being engaged with the first transmitting roller **123**. At the moment, the two first threaded sleeve components **124** are driven to transversely move along the transverse rotating shaft **122** by virtue of the first internal threads **129** of the two first threaded sleeve components **124** being respectively engaged with the first external threads **127** and the second external threads **128** of the two opposite sides of the two transverse rotating shaft **122**. So the two first threaded sleeve components **124** are away from each other to increase the distance between the two aural regions **32**. The two lateral portions **312** are away from each other with the two first threaded sleeve components **124** being away from each other by virtue of the two aural regions **32** being respectively connected with the two slidable locating elements **136**. The distance between the two lateral portions **312** is increased. When the first motor **21** rotates in the reverse direction, the distance between the two aural regions **32** are reduced, and simultaneously, the distance between the two lateral portions **312** are reduced. So that a width of the head model mechanism **30** is adjusted.

Referring to FIG. **1** to FIG. **4** again, when the second motor **22** is started to rotate in the forward direction, the second motor **22** drives the vertical rotating shaft **132** to rotate so as to drive the second threaded sleeve component **133** to move upward along the third external threads **137** of the vertical rotating shaft **132**. The second threaded sleeve component **133** drives the fastening plate **134** and the second sliding rod **135** to move upward so that the second sliding rod **135** drives the two slidable locating elements **136** to move upward respectively along the two guiding rods **51**. A distance between the parietal region **31** and the aural regions **32** is increased. When the second motor **22** rotates in the reverse direction, the distance between the parietal region **31** and the aural regions **32** is reduced. So that headset test device **100** adjusts the distance between the parietal region **31** and the aural regions **32** to simulate different widths and heights of different heads by virtue of the first motor **21** and the second motor **22**.

After completing adjusting the head model mechanism **30**, the headset **200** is worn on the head model mechanism **30**. Specifically, the headset **200** includes a wearing portion **201** and two earcaps **202**. The wearing portion **201** is worn on the top portion **311** and the two lateral portions **312** of the parietal region **31**. The two earcaps **202** are worn on the two first sensing areas **321**. The temperature sensing unit **43** disposed in the two artificial ears **324** senses quantitative data of a temperature. The pressure sensing unit **42** senses quantitative data of clamping pressure. Then the two earcaps **202** are respectively worn on the second sensing areas **322**, the force sensing unit **41** senses quantitative data of a force. In this embodiment, the force sensing unit **41** senses the quantitative data of a clamping force. So the headset test device **100** tests the physical quantities of the headset **200**, including the clamping pressure, the force and the temperature, to know the quantitative data of the comfort degree of wearing the headset **200**.

As described above, the headset test device **100** adjusts the distance between the parietal region **31** and the aural regions **32** to simulate different widths and heights of different heads by virtue of the first motor **21** and the second motor **22**, and the clamping pressure, the force and the temperature are tested by virtue of the single headset test device **100** to know the quantitative data of the comfort degree of wearing the headset **200**. Thus, it facilitates providing the headset **200** with the better comfort degree for the music amateur.

What is claimed is:

1. A headset test device, comprising:

a supporting frame including a fixing base, a transverse adjusting supporter assembly and a vertical adjusting supporter assembly which are mounted on the fixing base;

a drive adjusting system including a first motor and a second motor, the transverse adjusting supporter assembly and the vertical adjusting supporter assembly being connected with and being driven by the first motor and the second motor, respectively;

a head model mechanism including a parietal region and two aural regions, the parietal region being mounted on the vertical adjusting supporter assembly, and being driven by the second motor to vertically move along the vertical adjusting supporter assembly, the two aural regions being abreast mounted to two opposite sides of the transverse adjusting supporter assembly transversely, the two aural regions being driven by the first motor to move close to or away from each other along the transverse adjusting supporter assembly for increasing or reducing a distance between the two aural regions, each of the two aural regions being equipped with an artificial ear, the parietal region being located above an interval between the two aural regions; and

a sensing system including a force sensing unit, a pressure sensing unit and a temperature sensing unit, the force sensing unit being disposed to one of the aural regions, the pressure sensing unit being disposed to the parietal region and the aural regions, the temperature sensing unit being disposed in the artificial ears of the aural regions.

2. The headset test device as claimed in claim **1**, wherein the transverse adjusting supporter assembly includes two fastening elements, a transverse rotating shaft, a first transmitting roller, two first threaded sleeve components, a first sliding rod and two sliding blocks, the two fastening elements are respectively mounted on two opposite sides of the fixing base vertically, the first transmitting roller is mounted around a middle of the transverse rotating shaft, the transverse rotating shaft together with the first transmitting roller is pivotally mounted between the two fastening elements, the two first threaded sleeve components respectively surround two opposite sides of the transverse rotating shaft, the transverse rotating shaft rotates so as to drive the two first threaded sleeve components to transversely move along the transverse rotating shaft, the two sliding blocks are respectively disposed around two opposite sides of the first sliding rod, the first sliding rod together with the two sliding blocks is fastened between the two fastening elements, the first sliding rod is parallel to and is located behind the transverse rotating shaft.

3. The headset test device as claimed in claim **2**, wherein two outsides of the two opposite sides of the transverse rotating shaft respectively define a plurality of first external threads and a plurality of second external threads which spiral in opposite directions, an inside of each of the first threaded sleeve components defines a plurality of first internal threads, the transverse rotating shaft rotates to make the first internal threads respectively engaged with the first external threads and the second external threads so as to drive the two first threaded sleeve components to transversely move along the transverse rotating shaft.

4. The headset test device as claimed in claim **2**, wherein the first motor is mounted on the fixing base, the drive adjusting system further includes a second transmitting roller mounted around one end of the first motor, the first motor rotates to drive the second transmitting roller to rotate so as to drive the first transmitting roller together with the transverse rotating shaft to rotate by virtue of the second transmitting roller being engaged with the first transmitting roller.

5. The headset test device as claimed in claim **2**, wherein the vertical adjusting supporter assembly includes a limiting element, a vertical rotating shaft, a second threaded sleeve component and a fastening plate, the limiting element is vertically mounted on the fixing base and is located behind the transverse adjusting supporter assembly, the second threaded sleeve component surrounds the vertical rotating shaft, the fastening plate is fastened to the second threaded sleeve component and is parallel to the fixing base, the vertical rotating shaft is vertically mounted to the limiting element.

6. The headset test device as claimed in claim **5**, wherein the second motor is connected to a bottom end of the vertical rotating shaft so that the second motor drives the vertical rotating shaft to rotate.

7. The headset test device as claimed in claim **5**, wherein an outside of the vertical rotating shaft defines a plurality of third external threads, an inside of the second threaded sleeve component defines a plurality of second internal threads, the vertical rotating shaft rotates to make the third external threads engaged with the second internal threads so as to drive the second threaded sleeve component together with the fastening plate to vertically move along the vertical rotating shaft.

8. The headset test device as claimed in claim **5**, wherein the vertical adjusting supporter further includes a second sliding rod and two slidable locating elements, the second sliding rod is mounted on the fastening plate and is parallel to the transverse rotating shaft, the two slidable locating elements are slidably disposed around two opposite sides of the second sliding rod, the two slidable locating elements are capable of transversely sliding along the second sliding rod, the vertical rotating shaft rotates so as to drive the second threaded sleeve component together with the fastening plate to vertically move along the vertical rotating shaft.

9. The headset test device as claimed in claim **8**, wherein the parietal region includes a top portion and two lateral portions, the top portion is mounted on the fastening plate, and is located in front of second sliding rod, a front end of the top portion projects beyond a front of the fastening plate, the two lateral portions are fastened to two fronts of the two slidable locating elements and are respectively located above the two aural regions.

10. The headset test device as claimed in claim **9**, wherein each of the two aural regions includes a first sensing area, and a second sensing area located in front of the first sensing area, the first sensing area is corresponding to a bottom of one of the lateral portions, the artificial ear is assembled to an outer side of the first sensing area, an inner side of the first sensing area of each of the two aural regions is equipped with a heating unit for heating peripheral components of fastening the artificial ear.

11. The headset test device as claimed in claim **10**, wherein the force sensing unit is disposed to the second sensing area of one of the aural regions, the pressure sensing unit is disposed to the top portion, the two lateral portions, the two artificial ears and two circumjacent areas of the two first sensing areas respectively around the two artificial ears.

12. The headset test device as claimed in claim **9**, wherein two rear ends of the two aural regions are respectively fastened to the two first threaded sleeve components, the head model mechanism further includes two first connecting blocks fastened to the two rear ends of the two aural regions, respectively, the two sliding blocks are respectively fastened to two rear surfaces of the two first connecting blocks, so the two first threaded sleeve components are respectively connected with the two sliding blocks, the first threaded sleeve components transversely move along the transverse rotating shaft to drive the two aural regions to transversely move along the first sliding rod.

13. The headset test device as claimed in claim **12**, further comprising two guiding rods and two second connecting blocks, the two guiding rods being respectively fastened to the two first connecting blocks vertically, two rear ends of the two slidable locating elements being slidably disposed to the two guiding rods, respectively, two rear ends of the two slidable locating elements being slidably disposed to the two guiding rods by virtue of the two second connecting blocks, respectively, the two slidable locating elements being capable of sliding upward and downward along the two guiding rods, respectively.

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